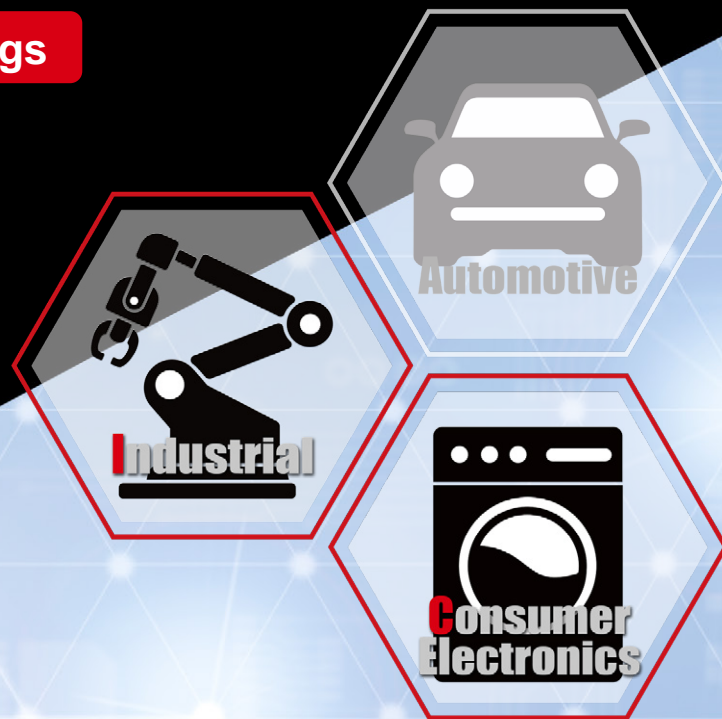


0.3mm ball pitch achieves maximum space savings

Ultra-Compact WLCSP* Low Input Offset Voltage High Accuracy Op Amp

*Wafer Level Chip Size Package

TLR377GYZ



The TLR377GYZ is a WLCSP* Op Amp that achieves maximum space savings in sets requiring greater miniaturization. Providing high accuracy in a compact size while including a shutdown function to reduce power consumption makes it ideal for battery-powered sensing applications.

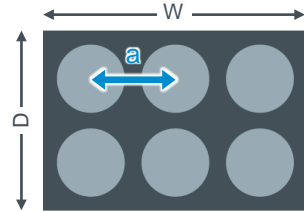
*Wafer Level Chip Size Package

Features

- **Ultra-compact WLCSP contributes to device miniaturization**
Achieves external dimensions of $0.88 \times 0.58 \times 0.33$ (Max) mm
- **Suitable for compact sensing applications by achieving a balance between size and accuracy**
Delivers low offset voltage with low noise: 1mV (Max) offset voltage, $12\text{nV}/\sqrt{\text{Hz}}$ (Typ) input equivalent noise voltage density
- **Built-in shutdown function reduces device power consumption**
Limiting Op Amp operation to sensing-only periods significantly reduces standby current to just $1.5\mu\text{A}$ (Max)



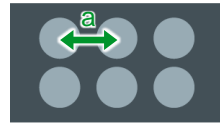
Size Comparison vs Conventional Products



Conventional Product A

W: 1.565mm, D: 1.057mm

Ball Pitch a: 0.5mm



Conventional Product B

W: 1.308mm, D: 0.727mm

Ball Pitch a: 0.35mm



New Product (TLR377GYZ)

W: 0.88mm, D: 0.58mm

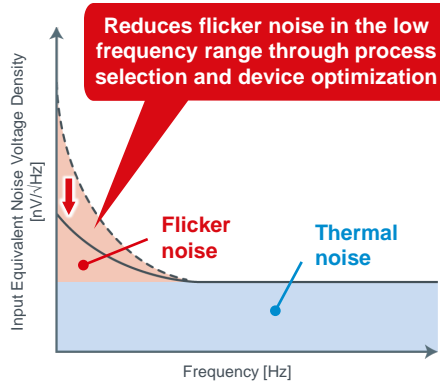
Ball Pitch a: 0.3mm

Achieves the ultimate in space savings

Suitable for Compact Sensing Applications by Achieving a Balance Between Size and Accuracy

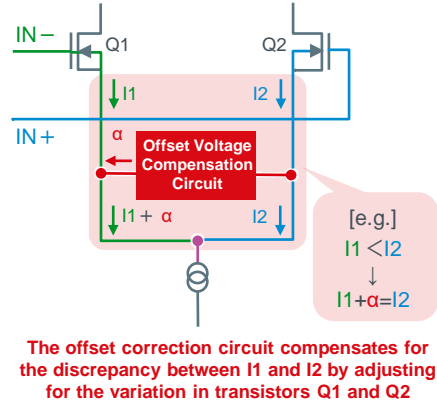
Achieves an Ideal Balance between Smaller Chip Size and High Accuracy

Process Technology



Achieves ultra-low noise

Circuit Design Technology

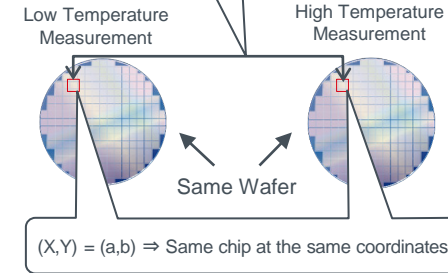


Contributes to lower offset

Guaranteed by Actual Measurements

Measurement Technology

Recording the positional information of all chips during wafer measurement makes it possible to link the results of low and high temperature measurements

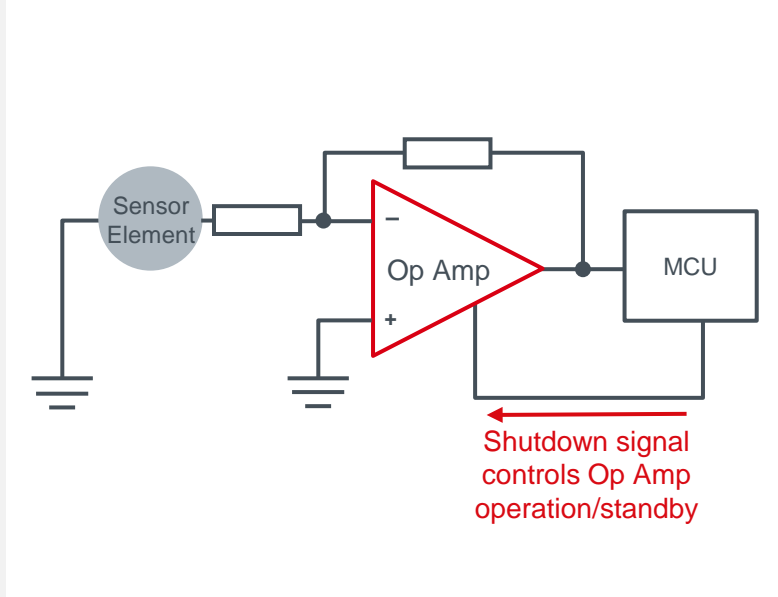


Guarantees the maximum value of input offset voltage temperature drift

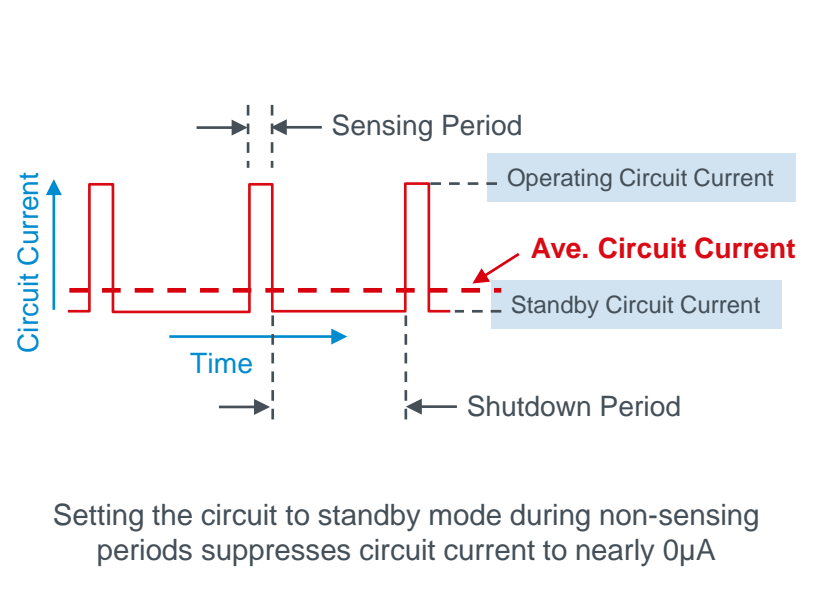
Provides worry-free operation through actual measurements while achieving high accuracy by leveraging process and circuit design technologies

Built-in Shutdown Function Reduces Device Power Consumption

Application Circuit



Shutdown Function Operation



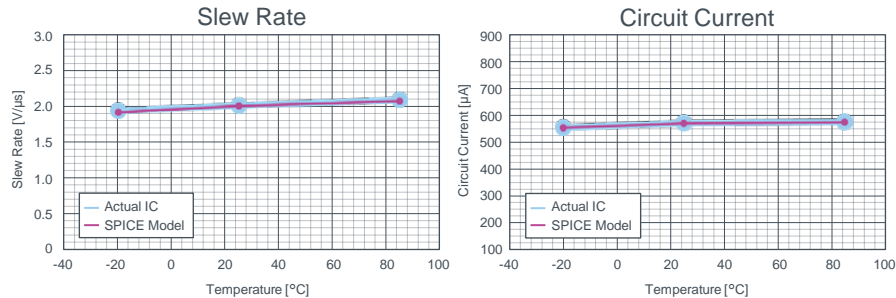
Limiting Op Amp operation to sensing-only periods results in exceedingly low average circuit current

High Accuracy SPICE Models: ROHM Real Models

ROHM's high accuracy SPICE models succeed in achieving a perfect match between measured and simulated IC values by faithfully reproducing the electrical and temperature characteristics of the IC using original model-based technology

Example of Characteristics Verification due to Temperature Changes for the New Product [TLR377GYZ] ($V_{DD} = 5V$)

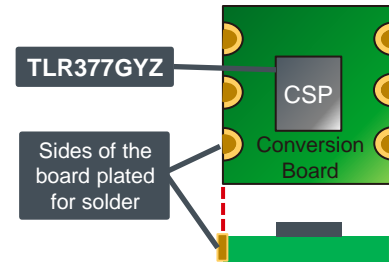
Spice Model (ROHM Real Model) vs Actual IC



Completely reproduces temperature characteristics



CSP ⇒ SSOP Conversion Board

Optional conversion board (with pre-mounted TLR377GYZ) allows for immediate evaluation by mounting it on an SSOP6 board



Available on
[ROHM's website](#)

Ultra-Compact WLCSP Op Amp Characteristics

Part No.	ch	Supply Voltage [V]	Circuit Current (Typ) [μ A]	Shutdown Circuit Current (Max) [μ A]	Input Offset Voltage (Max) [mV]	Input Offset Voltage Temperature Drift (Max)[μ V/ $^{\circ}$ C]	Input Equivalent Noise Voltage Density (Typ)[nV/ \sqrt Hz]	Operating Temperature [$^{\circ}$ C]	Package
New TLR377GYZ  	1	1.8 to 5.5	585	1.5	1.0	6	12	-20 to +85	YCSP30L1 (6Pin)

Click on the  icon to access the product page and the  icon to view the datasheet on ROHM's website.

Application Examples

- Smartphones
- IoT devices
- Wearables
- Small drones, etc.



Optimized for sensing applications in battery-powered devices

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